

WHAT IS CLAIMED IS:

1. A computer-readable medium having computer-executable instructions, comprising:

retrieving meta-data of a resource that is replicated on
5 a plurality of machines, the resource having meta-data and
content that resides on each machine on which the resource is
replicated, the meta-data including one or more values that
are updated whenever the content of the resource is changed
via any local update and a fence value that is independent of
10 any local changes to the content;

comparing a first fence value of the content on a first
machine of the plurality of machines with a second fence value
of the content on a second machine of the plurality of
machines; and

15 if the first fence value is of higher precedence than the
second fence value, updating the second machine.

2. The computer-readable medium of claim 1, wherein the
meta-data is stored in a store separate from the content.

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3. The computer-readable medium of claim 1, wherein
updating the second machine comprises determining one or more

differences between the content on the first and second machines and transmitting the one or more differences.

4. The computer-readable medium of claim 1, wherein
5 updating the second machine comprises transmitting the meta-data only.

5. The computer-readable medium of claim 4, wherein the content on the first and second machines is the same.

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6. The computer-readable medium of claim 1, wherein the content comprises file data and file attributes.

7. The computer-readable medium of claim 1, wherein
15 each meta-data on each machine comprises a digest that summarizes the resource.

8. The computer-readable medium of claim 8, further comprising comparing the digests of the meta-data on the
20 machines and bypassing updating if the digests are equivalent.

9. The computer-readable medium of claim 1, wherein updating the second machine comprises updating the second fence value to equal the first fence value.

5 10. The computer-readable medium of claim 1, further comprising if the fence values are equivalent, comparing other data in the meta-data to determine whether content should be updated.

10 11. The computer-readable medium of claim 1, wherein each fence value is assigned to a portion or portions of its respective resource.

12. The computer-readable medium of claim 1, wherein
15 content with a certain fence value is not propagated to other machines.

13. The computer-readable medium of claim 1, wherein
content with a certain fence value is invisible to other
20 machines.

14. The computer-readable medium of claim 1, further comprising setting one of the fence values to a maximum of (itself + 1) and (a clock time) of the machine on which the resource including the one fence value resides.

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15. The computer-readable medium of claim 1, further comprising keeping each fence value the same as the content associated with the fence value changes.

10 16. A computer-readable medium having computer-executable instructions, comprising:

determining whether a first resource residing on a first machine should be used to update a second resource residing on a second machine, each resource associated with meta-data and
15 content, each meta-data including one or more fields that are updated whenever the content of the associated resource is changed and a fence value, each fence value indicating whether its associated resource should be used to update a resource on another machine at a higher precedence than from other meta-
20 data;

if the fence value of the second resource indicates that the second resource should not be propagated from the second machine, preventing propagation from the second machine; and

if the fence value of the first resource is of a higher
5 precedence than the fence value of the second resource,
updating the second resource from the first resource.

17. The method of claim 16, further comprising if the fence values of the first and second resources are equivalent,
10 determining which machine will update the other based on meta-data other than the fence values.

18. The method of claim 17, wherein the other meta-data comprises a logical clock indicating the last time the
15 corresponding content was updated.

19. The method of claim 18, wherein a fence value indicates that its corresponding resource may be propagated to other machines until another resource with a higher fence
20 value is located on another machine.

20. The method of claim 16, wherein the meta-data associated with the first resource is stored in a separate data structure from its corresponding resource.

5 21. The method of claim 20, wherein the data structure is corrupted or deleted, further comprising rebuilding the data structure and decrementing the fence value associated with the first resource.

10 22. The method of claim 21, further comprising rebuilding the data structure a plurality of times and decrementing the fence value associated with the first resource each time the data structure is rebuilt.

15 23. The method of claim 22, further comprising if the fence value of the second resource is of a higher precedence than the fence value of the first resource, updating the first resource from the second resource.

20 24. A method for replicating data, comprising:
loading data onto a first machine;

marking the data with a fence value that indicates that the data should not be transmitted from the first machine to update data on any other machine;

synchronizing at least a portion of the data with data on
5 a second machine.

25. The method of claim 24, further comprising after synchronizing the at least a portion of the data, marking the remaining portion of the data with a fence value that
10 indicates that the data can be transmitted from the first machine to update data on any other machine.

26. The method of claim 24, further comprising after synchronizing the at least a portion of the data, deleting the
15 remaining portion of the data.

27. The method of claim 24, wherein the data is loaded from a backup.

20 28. The method of claim 24, wherein the data is loaded from a copy of data sent from another machine.

29. The method of claim 24, further comprising marking corresponding data on a second machine that indicates that the corresponding data should be synchronized during synchronization.

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30. The method of claim 24, further comprising changing a portion of the data and marking the changed portion with a fence value that indicates that the changed portion should be synchronized during synchronization.

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31. A system for replicating data, comprising:
a first machine having a first set of resources;
a second machine having a second set of resource, wherein
each resource on each machine is associated with meta-data and
5 content, each meta-data including one or more fields that are
updated whenever the content of the associated resource is
changed and a fence value, each fence value indicating whether
its associated resource should be used to update a resource on
another machine independently from other meta-data, wherein
10 the first and second machines are configured to:
communicate information regarding the resources
contained by both; and
update each resource that is out-of-date according
to the following precedence:
15 if a fence value of a resource on one of the
machines is of higher precedence than the fence value of a
corresponding resource on the other machine, updating the
other machine with the resource on the one machine; otherwise
updating the resource on the machines based on
20 data other than the fence values.

32. The system of claim 31, wherein the first set of resources is loaded from a backup and the fence values thereof are set to cause the first set of resources to have precedence over any other set of resources, such that any other set of
5 resources on any other machine that corresponds to the set of resources are updated from the first set of resources.

33. The system of claim 31, wherein the fence values of the first set of resources are marked to have precedence over
10 corresponding resources on other machines, such that the corresponding resources are updated from the first set of resources.